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Construction Management Problems Have Delayed Completion of the New Plutonium Facilities at Rocky Flats, Colorado. PSAD-78-90; B-183920. June 2, 1978. 16 pp. + 2 appendices (2 pp.).

Report to Secretary, Department of Energy; by J. Dexter Peach (for Monte Canfield, Jr., Director, Energy and Minerals Div.).

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Cost, schedule, and performance data of new plutonium facilities under construction at Rocky Flats, Colorado, and Los Alamos, New Mexico, were reviewed. Both projects are under the administration and management of the Department of Energy's Albuquerque Operations Office (A00). The Rocky Flats nuclear weapons plant is the key producer of plutonium parts used in nuclear weapons, and the Los Alamos Scientific Laboratory is one of the agency's two nuclear weapons research and development facilities. Findings/Conclusions: Unnecessary cost growth and schedule delays were experienced at the Rocky Flats project because of poor design control, unrealistic schedules, premature contract awards for mechanical equipment installations, and poor estimating and cost control practices. The A00 compounded cost and schedule problems by not exercising adequate project management. It relied on its contractors to manage the project, and its success or failure depended on the contractor's performance rather than on agency management. AOC employed similar organizational and management approaches at Rocky Flats and Los Alamos, but the Los Alamos project was more successful because the agency and its contractors worked together more effectively. New procedures implemented by A00 should improve the management of future construction projects.

Recommendations: The Secretary of Energy should assure that the A00 implements its procedures and considers the use of construction management firms for future construction projects if it does not have adequate in-house capabilities. He should provide the Congress with cost estimates of ongoing projects which identify all project-related costs including those funded by operating expense appropriations. The A00 should develop cost estimating guidelines for use by its staff and contractors to assure that such estimates include all necessary cost elements and provide a sound basis for evaluation. (BRS)

6589

REPORT BY THE U.S.

General Accounting Office

Construction Management Problems Have Delayed Completion Of The New Plutonium Facilities At Rocky Flats, Colorado

The Department of Energy plutonium recovery and waste treatment facility project at Rocky Flats has experienced a \$47 million cost growth and a 1½ year schedule delay. However, the Albuquerque Operations Office has adopted corrective measures to improve construction management procedures which led to the cost increases and schedule delays. GAO recommends that the Secretary of Energy assure that the Albuquerque Operations Office implements its corrective action to improve construction management, and that it consider using construction management firms to assist in future projects if inhouse capabilities are inadequate.



PSAD-78-90
JUNE 2, 1978



UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

ENERGY AND MINERALS
DIVISION

B-183920

The Honorable
The Secretary of Energy

Dear Mr. Secretary:

This report summarizes the results of our review of the plutonium facilities at Rocky Flats, Colorado, and Los Alamos, New Mexico.

This report contains recommendations to you on pages 10 and 14. As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committees on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Director, Office of Management and Budget.

Sincerely yours,

for

A large, stylized handwritten signature in black ink, appearing to read "Monte Canfield, Jr.".

Monte Canfield, Jr.
Director

D I G E S T

The Department of Energy has been constructing plutonium facilities at Rocky Flats, Colorado, and Los Alamos, New Mexico, because current facilities are outdated and crowded.

Construction management problems increased costs and delayed completion of the new plutonium facilities at Rocky Flats, Colorado. The Los Alamos project, because of better cooperation between management and contractors, was able to avoid the problems experienced at Rocky Flats.

The baseline estimate to design and construct the facilities at Rocky Flats has increased from \$140 million to a current estimate of \$187 million. The current estimate does not include \$15 million of project-related costs that are paid from the operating contractor's expense budget. Construction completion has been delayed about 1 1/2 years from the baseline estimate.

Some problems were unavoidable due to the complexity of the project, but the Albuquerque Operations Office compounded cost and schedule problems by not exercising adequate project management. GAO concluded that management did not have

- a formal management plan,
- good design control,
- realistic schedules,
- sound cost estimating and control practices,
and
- a timely phased contract award for mechanical equipment installations.

PSAD-78-90

The Albuquerque Operations Office (which is responsible for construction) has taken action to improve management by replacing the major construction contractor, establishing a full-time project team, and instituting new procedures and a formal management plan.

GAO believes that the new procedures developed by the Albuquerque Operations Office should, if implemented, improve management of future construction projects. GAO recommends that the Secretary of Energy assure that the Albuquerque Operations Office implements its procedures and considers the use of construction management firms for future construction projects if it does not have adequate inhouse capabilities. We also recommend that the Albuquerque Operations Office develop cost estimating guidelines for use by its staff and contractors to assure that such estimates include all necessary cost elements and provide a basis for evaluation. We further recommend that the Secretary of Energy provide Congress with cost estimates on ongoing projects which identify all project related costs including those funded by operating expense appropriations.

Department of Energy officials generally agreed with our recommendations.

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ABBREVIATIONS

ALOO	Albuquerque Operations Office
GAO	General Accounting Office

CHAPTER 1

INTRODUCTION

A fire in 1969 at the Rocky Flats, Colorado, plutonium production facility, followed by independent investigations of fire and safety hazards at certain plutonium facilities, led to the conclusion that the existing plutonium recovery and waste treatment facilities at Rocky Flats and the plutonium processing facility at Los Alamos, New Mexico, would have to be replaced. The investigations also led to the conclusion that current or planned modifications would enable the production facilities at Rocky Flats to meet safety requirements.

We reviewed cost, schedule, and performance data of the new plutonium facilities under construction at Rocky Flats, Colorado, and Los Alamos, New Mexico. Both projects are under the administration and management of the Department of Energy Albuquerque Operations Office (ALOO).

THE ROCKY FLATS PLUTONIUM RECOVERY AND WASTE TREATMENT FACILITIES

The Rocky Flats, Colorado, nuclear weapons plant is the key producer of plutonium parts used in nuclear weapons. The facilities are comprised of about 90 buildings and structures on about 390 acres.

Plutonium-contaminated wastes from production operations are recycled through a recovery facility, where plutonium is extracted for reuse in weapons. Residues from the extraction process are then treated in the waste treatment facility and shipped to storage facilities in Idaho.

Existing plutonium recovery and waste treatment facilities at Rocky Flats are crowded; this makes it hard to maintain health and safety standards. The facilities were built in 1953--long before minimum design criteria were established for plutonium-handling facilities. The replacement facility contains three major operations in one building--plutonium recovery, waste treatment, and support; together, they occupy 335,000 square feet. The building houses a complicated arrangement of chemical processes that are to meet safety and structural criteria much more restrictive than previous standards. For example, human radiation exposure is limited to 20 percent of previous exposure limits.

To meet the more restrictive exposure criteria, the recovery processes will be controlled remotely--a feature which was expensive to achieve. The facility is also designed to withstand the effects of earthquakes registering 6.0 on the Richter Scale as well as tornado-force winds and pressures.

To procure equipment, design and construct the new facility, and upgrade existing facilities, 34 contracts were issued to 25 contractors. More work needs to be done before completion--two contracts remain to be awarded. Engineering design was performed by C.F. Braun and Company. The DCW Chemical Company and its successor, Rockwell International (the contractors operating the Rocky Flats plant) were also responsible for reviewing the design for agency approval. Mechanical installation (the largest single construction effort) was initially contracted with C-E Lummus. The Swinerton and Walberg Company replaced Lummus in November 1976.

THE LOS ALAMOS PLUTONIUM PROCESSING FACILITY

The Los Alamos Scientific Laboratory (New Mexico) is one of the agency's two nuclear weapons research and development facilities. The laboratory complex includes accelerators, research reactors, radioactive materials separation facilities, and other experimental facilities that use radioactive materials.

The laboratory develops experimental weapons designs as well as advanced fuels for the agency's liquid metal fast breeder reactor program, among other functions, in its plutonium processing facility. The new facility, authorized by the Congress at the same time as the Rocky Flats facilities, replaces one that was initially constructed in 1943 and has been expanded several times. The old facility is a series of steel buildings that do not meet current agency criteria for seismic and tornado effects or for personnel radiation exposure.

The architect/engineer for the facility, Fluor Engineers and Constructors, Inc., was responsible for engineering design. Wallace, Brown-Olds, Howard, a joint venture, was responsible for the mechanical installation in the new structure.

SCOPE OF REVIEW

Our review was conducted at Department of Energy Headquarters, Washington, D.C.; the Albuquerque Operations Office, New Mexico; the Los Alamos Area Office, New Mexico; the Rocky Flats Area Office, Colorado; and the C.F. Braun and Company, Alhambra, California. We reviewed the construction projects at Los Alamos and Rocky Flats but limited our work at Los Alamos to an examination of the problem areas identified at Rocky Flats. We reviewed documents, records, reports, and held discussions with agency and project officials.

CHAPTER 2

POOR MANAGEMENT CONTRIBUTED TO

COST GROWTH AND SCHEDULE DELAYS AT ROCKY FLATS

The Rocky Flats project is technically complex, and some problems could not be avoided. However, unnecessary cost growth and schedule delays were experienced because of poor design control, unrealistic schedules, premature contract award for mechanical equipment installations, and poor estimating and cost control practices.

PROJECT ORGANIZATION

ALOO assigned a manager to the project but did not provide commensurate authority to fulfill this responsibility. Since the manager was also responsible for all other construction at Rocky Flats, he could not devote full time to this single project. By contrast, major project contractors assigned full-time personnel from the start. A full-time agency project manager was not assigned until November 1976--6 years after the project was authorized.

Before January 1978, ALOO operated without a formal management plan. Such a plan could have avoided some of the management problems addressed in the following sections of this chapter.

POOR DESIGN CONTROL INCREASED THE ENGINEERING EFFORT

ALOO attempted to, but did not clearly identify, the roles and responsibilities of its design contractors. This contributed to the substantial increase in engineering costs--an increase from \$16 million to \$32 million.

In 1969, when planning began for construction of a new plutonium and waste treatment facility, DOW made an informal proposal to perform architect/engineering services for design development. The proposal was rejected because ALOO did not believe that DOW had a sufficient engineering capability.

ALOO requested design proposals from recognized architect/engineering firms. Several firms submitted proposals, and a selection panel chose Braun over the objections of the DOW representative on the panel. The DOW representative stated that he would not have objected to the selection of another firm, and that the objection stemmed from previous work experiences with Braun on other Rocky Flats construction projects.

Braun was directed to prepare studies of design alternatives, and DOW was directed to develop design criteria for equipment and chemical processes. ALOO planned to combine the two efforts into a single design base, and provisions were made to keep each contractor advised of the other's work.

Based on Braun's conceptual design, a \$113 million cost estimate was submitted to the Congress in December 1971. DOW submitted its design criteria to Braun in January 1972. The DOW effort went far beyond equipment and chemical process criteria; thus, ALOO was faced with two design concepts with major differences. These differences are noted in the following table.

	<u>Braun concept</u>	<u>Dow concept</u>	<u>As built</u>
Plutonium recovery facility:			
Instrumentation (feet of control board)	210	500	520
Size (square feet)	153,000	221,000	260,000
Ventilation (cubic feet of air per minute)	220,920	360,000	383,000
Tankage (number of primary processing tanks)	28	69	69
Waste treatment facility:			
Capacity (million gallons per year)	20	31	31
Size (square feet)	29,000	58,000	43,600
Ventilation (cubic feet of air per minute)	Not available	36,000	36,000

Both Braun and DOW considered their concepts the basis for the facility's design. Braun pointed out that the cost estimate provided to the Congress was based on its concept; thus, if DOW criteria were used it would require a new project cost estimate. After several meetings with Braun and DOW, Braun was instructed to use its concept as the engineering and cost control base but to be very aggressive in adopting features of the DOW design criteria. Because DOW was experienced in plutonium operations, Braun was informed that DOW criteria would represent the basis for process design.

DOW was instructed to review for agency approval all documents, drawings, specifications, studies, design, and layout sketches prepared by Braun. As the design progressed, Braun alleged that because engineering was proceeding by DOW criteria, its contractually negotiated engineering staffhours, cost, and fee were invalid, and requested changes in the scope of work. Braun also alleged that the project's cost estimate no longer reflected the facility actually being designed. ALOO did not agree with the magnitude of Braun's proposed scope changes, but agreed that changes had occurred and made contract modifications increasing Braun's cost and fee.

Other reasons cited by Braun and ALOO for the increase in the project's engineering included

- an initial underestimate of the engineering work scope;
- numerous design changes requiring considerable rework;
- internal problems with Braun, such as key personnel turnover and low productivity;
- problems with the design of Government-furnished equipment; and
- changing interpretations of the agency's minimum design criteria.

ALOO attempted to establish a design team that would draw on each member's expertise and talents. It achieved its desire for participative design, and the final design was a product of evolution with collateral input from DOW, Braun, and ALOO. Design, however, took longer and cost more than anticipated because the members did not function effectively as a team to efficiently overcome problems.

POOR PLANNING CAUSED UNREALISTIC SCHEDULES

There were two primary reasons why the established target dates were not realistic. ALOO did not prepare an integrated schedule to identify the relationships between design, procurement, and construction, and it failed to incorporate highly probable events that affected schedule milestones.

An integrated schedule would have identified critical project activities and their relationships, and put them in a logical sequence. Without integrated scheduling, ALOO could not accurately assess the effect of changes in the critical path or determine their effect on the overall schedule. Such a system would have helped produce better scheduling decisions.

For example, the most critical construction phases that affected the Rocky Flats schedule were the building structure and mechanical installations. Structure completion was delayed approximately 17 months. However, ALOO did not delay the start of the mechanical installation contract. Instead, it contracted for mechanical installation and subsequently allowed the physical work to begin when the substructure work was falling further behind schedule. Consequently, both contractors' workers were interfering with each other's work. We believe that the premature initiation of the mechanical installation work contributed to the declining labor productivity later experienced by the mechanical installation contractor.

Although the agency was conscious of the substructure's status when deciding to proceed with mechanical installations, an integrated schedule would have allowed greater visibility of how this decision affected the total project.

ALOO also omitted highly probable events from the schedules, thus creating optimistic and unrealistic milestones. Adequate consideration was not given to normal construction delays that result from inclement weather, labor and interface problems, and material and equipment delivery delays. Additionally, completion dates for planning and reporting were repeatedly based on the most optimistic expectations.

COST ESTIMATING AND CONTROL PRACTICES WERE INADEQUATE

A reliable cost estimate coupled with a reporting system that is consistent with the estimate is essential for good cost control. Since the cost estimate is a key ingredient in cost control, the estimate must be complete and based on the most current available information--otherwise cost control is compromised.

The circumstances surrounding the cost estimate for mechanical installation suggest that ALOO needs to strengthen its control over the cost estimating process. Mechanical installation was contracted with C-E Lummus under a cost-plus-fixed-fee arrangement. The project estimate prepared by the

contractor in October 1975 contained numerous errors that understated the cost estimate by about \$9 million.

The contractor underestimated material quantities and related labor costs by \$7 million. Lummus also used noncurrent rates in determining its composite labor rate and escalation was not systematically computed for the full construction period--causing an additional \$3 million understatement. One line item in the Lummus estimate was overstated by \$1 million due to a mathematical error. ALOO should have detected these errors during required routine verification. However, a routine verification was not completed due to lack of time, and management believed that a company the size of Lummus should be capable of preparing a credible cost estimate.

Having established a project control estimate, ALOO and its construction contractor did not follow through with a cost reporting system that was consistent with the estimate. A sound cost control system should provide management with reports that identify variances between estimated and actual costs for all important elements.

The monthly cost report prepared by the construction contractor reported unit labor rates and quantity variances in a manner that allowed comparison with the cost estimate. However, material cost, which was about half the estimated cost for mechanical equipment installation, was not presented in a way that would allow assessment of rate or quantity variances. We believe that this practice precluded adequate visibility over project cost performance by top management.

MANAGEMENT CHANGES

Changes in contractors and agency management contributed to cost increases and schedule delays. In 1975 ALOO replaced DOW. Also, Braun changed project managers once and Lummus changed project managers twice. In late 1976 ALOO replaced the major mechanical installation contractor with a new contractor and appointed a full-time project manager with a dedicated project office to improve project performance. These actions were taken about 2 years after the mechanical installation contract was awarded and 6 years after project authorization. A formal management plan was issued by the project manager in January 1978.

ALOO established in November 1977 the following procedures to enhance control on future major construction projects:

- Formal management plans.
- Full authority and responsibility vested in an agency project manager.
- A single design base.
- Integrated and realistic schedules.
- Adequate verification of cost estimates.
- A reporting system consistent with the cost estimate.

CONCLUSIONS

ALOO relied on its contractors to manage the project; therefore its success or failure largely depended on the contractor's performance rather than agency management. In addition, ALOO

- allowed the development of competing and conflicting design concepts and failed to quickly and clearly resolve them;
- used unrealistic schedules;
- did not have sufficient time to adequately verify estimates for mechanical installation, although agency procedures require that estimates be verified; and
- did not have a system to track costs and identify causes for cost changes.

Project cost has had major increases and the schedule has slipped substantially because of the problems noted above. Therefore, recovery operations must continue in an outdated, inefficient, and hazardous facility that desperately needed replacement (according to the original project justification).

In November 1977 ALOO established a formal construction management plan that, if implemented, should improve management on future construction projects.

ALOO has not developed formal cost estimating procedures to guide architect/engineers and construction contractors. It relies on each contractor to prepare cost estimates by its own procedures, making it difficult to assure that all cost elements are consistently included in cost estimates.

RECOMMENDATIONS

ALOO has improved its procedures; these changes establish a framework that addresses most of the problems set forth in this report. The success of future construction projects will depend on the extent that these procedures are used and the abilities of agency personnel to apply them. Therefore, we recommend that the Secretary of Energy

- assure that ALOO implements the procedures specified in its new project management handbook, and
- consider the use of construction management firms by ALOO to assist in the management of future construction projects if it does not have adequate inhouse capabilities.

We also recommend that ALOO develop cost estimating guidelines for use by its staff and contractors to assure that such estimates include all necessary cost elements and to provide a basis for evaluation.

AGENCY AND CONTRACTOR COMMENTS

Department of Energy officials generally agreed with the above recommendations. The officials stated that they were aggressively pursuing compliance by its operations offices with the agency's comprehensive construction management procedures, which embody our recommendations.

C-E Lummus disagreed with adverse statements contained in the draft report regarding their performance and management of the project. In subsequent discussions with Lummus they agreed that some of the problems could have been minimized had they been more forceful and decisive in their management of the project.

C. F. Braun and Company felt certain references to Braun reflected unfairly on them because of incomplete description of circumstances but decided not to submit specific comments. A company official later advised us that the report was factually correct and fairly treated the overall occurrence of events.

CHAPTER 3
ROCKY FLATS COST, SCHEDULE,
AND PERFORMANCE STATUS

COST

Estimated cost has increased substantially since congressional authorization in 1970. Originally, the plutonium recovery facility was estimated to cost \$63 million; in December 1971 Braun's preliminary conceptual design was completed, and the plutonium recovery facility estimate was increased to \$95.6 million. A waste treatment facility and interim upgrading of existing facilities were added to the project scope at an additional estimated cost of \$13.5 million and \$5 million, respectively. The agency adjusted these estimates and requested funding of \$113 million.

In December 1972 Braun completed its final conceptual design and increased the estimated cost by \$16 million. Because ALOO viewed the \$113 million budget request as a cost ceiling, it reduced the project's scope to bring the cost in line with the budget.

In May 1974, when the detailed engineering design was about 65-percent complete on the mechanical equipment, 70-percent complete on the support facility, and nearly 100-percent complete on other work units, the project was estimated to cost \$140 million. This estimate was maintained when the overall design was completed, and we believe that this estimate represents the logical baseline for cost measurement.

Analysis of cost growth from baseline

Following the replacement of the major construction contractor (Lummus) in November 1976, a new estimate was prepared and the cost was increased from a \$140 million baseline to the current \$187 million estimate. It is virtually impossible to associate specific cost increases with a related cause because the agency did not account for cost changes as they occurred.

Our analysis of the cost growth showed that increases in construction costs account for 88 percent of the cost growth. The remaining increase was associated with engineering, procurement, and interim upgrading.

Mechanical equipment installation costs increased from \$59 million to \$97 million, representing the largest portion of the construction cost growth. We attribute this growth to

- understatement of the Lummus cost estimate due to errors in its preparation;
- a premature start of the mechanical installation work, which adversely affected worker productivity;
- ineffective management;
- escalation in labor and materials resulting from schedule stretchout and market conditions; and
- transition costs associated with the Lummus replacement.

Additional costs in direct support of facility construction

Rockwell provided a cost estimate that will be incurred in direct support of facility construction. These costs are paid from the operating contractor's expense budget and are in addition to the capital funds authorized by the Congress for project construction. These costs are summarized below.

Engineering services	\$ 1,068,000
Pretitle criteria	923,000
Engineering support to the architect/engineer	1,929,000
Instrument calibration	150,000
Other engineering, coordination, testing, and support	<u>11,056,000</u>
Total	<u>\$15,126,000</u>

SC.HEDULE

The start of full operations in the facility has been substantially delayed. In May 1974 the schedule associated with the \$140 million cost baseline showed that construction would be complete by June 1977. A comparison of baseline and current schedules indicates a 1 1/2 year delay. The following table summarizes the major schedule delays since May 1974.

<u>Work phase</u>	<u>Baseline</u>	<u>Current</u>	<u>Delay from baseline</u>
Complete detailed design	8/75	12/76	16 months
Complete construction	6/77	1/79	19 months
Begin startup	1/78	4/79	15 months

PERFORMANCE

The facility experienced many changes during design and construction, but it is being built in accordance with the capacity base that the Congress authorized. The types of changes being made represent process and safety refinements called for by changing agency requirements.

FUTURE COST GROWTH AND SCHEDULE DELAYS

Recent management changes should help control cost growth and further schedule delays on the project, but there is no assurance that these events will not occur. The current cost and schedule estimates established by ALOO in March 1977 are being maintained. Agency officials feel confident that construction will be completed in January 1979 and that the total project cost will not exceed \$187 million. The current mechanical installation contract provides financial incentives to the contractor if current schedule and cost are achieved.

CONCLUSION

The current \$187 million estimate to construct the project does not include costs of over \$15 million incurred by the operating contractor in direct support of the facility construction; those costs are paid from the operating contractor's expense budget. We believe that the Congress should be made aware of these project-related costs.

AGENCY COMMENTS

Agency officials stated that, beginning in fiscal year 1978, the Department of Energy, to keep the Congress more fully informed about other major costs funded from the operating expense appropriation, implemented criteria to identify new projects with major related costs funded from the operating expense appropriation. This is not being done for ongoing projects.

RECOMMENDATION

The action taken to keep the Congress informed is a step in the right direction, however, we believe that the Secretary of Energy should also provide the Congress with cost estimates on ongoing construction projects which identify all project related costs including those funded by operating expense appropriations.

CHAPTER 4

MANAGEMENT PROBLEMS EXPERIENCED AT ROCKY

FLATS WERE AVOIDED AT LOS ALAMOS

ALOO employed similar organizational and management approaches at Rocky Flats and Los Alamos. We believe, however, that the Los Alamos project was far more successful because the agency and its contractors worked together. They functioned as a team and were able to effectively resolve problems and had better control systems.

For example, during design there were major overruns in engineering staffhours and costs because of numerous changes and an evolutionary design process. ALOO employed a system similar to the one at Rocky Flats, whereby the operating contractor (the Los Alamos Scientific Laboratory) developed a design criteria that was to be molded into preliminary design studies performed by the architect/engineer, Fluor Engineers and Constructors, Inc. The two were successfully merged into a single design base, thereby avoiding the problem of each party thinking that it had its own design concept. Thus, a much better working relationship was established between Fluor and the Los Alamos Scientific Laboratory than between the architect/engineer and the operating contractor at Rocky Flats.

Although the agency did not prepare integrated schedules, the Los Alamos scheduling considered normal contingencies and was more detailed than that prepared at Rocky Flats. Lack of an integrated schedule did not limit management control because project phases were sequenced to allow the completion of one project before the start of another. For example, the contract for mechanical installation was not awarded until the building structure was completed--even though construction had been delayed.

Construction contractor estimates were not verified by the agency, but our review of the major construction estimate and related cost control reports indicated that adequate procedures were followed in both.

COST BASELINE MAINTAINED AT LOS ALAMOS

ALOO originally requested \$30 million in September 1970 to construct a plutonium processing facility that was scheduled to be operational by December 1975. After Fluor completed preliminary conceptual design, the facility cost was increased to \$55 million and the schedule remained

the same. When detailed design was nearly complete in May 1974, the cost estimate increased to \$75 million and scheduled completion slipped to August 1977. We view these as logical baseline estimates for cost and schedule measurement--and it appears that the agency will meet this cost baseline. When the mechanical installation contractor began work in December 1974, construction completion was estimated to be delayed 14 months--to October 1978. It also appears that this date will be met.

C-E Lummus
Combustion Engineering, Inc.
1515 Broad Street
Bloomfield, New Jersey 07003

Tel. 201/893-1515
Telex: 138198



May 2, 1978

Mr. Monte Canfield, Jr., Director
United States General Accounting Office
Washington, D. C. 20548
Energy and Minerals Division

Subject: Draft Report re Rocky Flats

Dear Mr. Canfield:

This will acknowledge receipt of your letter of April 20, 1978 transmitting for our review and comment a draft of the proposed report prepared by the U. S. General Accounting Office entitled "Construction Management Problems Have Delayed Completion of the New Plutonium Facilities at Rocky Flats, Colorado".

Since we were not consulted by the GAO in the preparation of this report we wish to refrain from offering any comments about it at this time. However, we do wish to record our disagreement with certain adverse statements and conclusions contained in the report with respect to the manner in which the work on the project was managed and performed by The Lummus Company.

Very truly yours,

THE LUMMUS COMPANY

A handwritten signature in cursive script that reads "Frank J. Giaccio".

Frank J. Giaccio
Director Special Projects

FJG:bc

C F BRAUN & CO
Engineers

ALHAMBRA CALIFORNIA 91802

ROBERT B HILL
Vice President

May 16, 1978

United States General Accounting Office
Monte Canfield, Jr, Director
Energy and Minerals Division
Washington, DC 20548

Gentlemen

REPORT ON NEW PLUTONIUM
FACILITIES AT ROCKY FLATS

We have reviewed the draft of a proposed report on Construction Management Problems Have Delayed Completion of New Plutonium Facilities at Rocky Flats, Colorado. We feel there are certain references to Braun that reflect unfairly on us because of incomplete description of circumstances. However, we also feel it would probably be undesirable for us to precipitate a new round of discussions. Therefore, we have decided to submit no specific comments.

Thank you for the opportunity to review the report.

Sincerely yours



RBH BL

(951329)